CLAIMS

1. A Calorimetric Flow Meter comprising an integrated circuit assembly incorporating a fluid flow channel, at least two temperature sensing elements operative to measure the temperature in different regions of the channel and a heating element located in between the temperature sensing elements to heat a region of the channel, wherein the integrated circuit assembly is encapsulated in a housing, the housing defining a fluid inlet allowing fluid to enter the channel and a fluid outlet allowing fluid to exit the channel.

2. A Calorimetric Flow Meter as claimed in claim 1 wherein the channel is provided upon a reverse face of the integrated circuit and the temperature sensing elements and heat sensing element are provided upon a front face.

3. A Calorimetric Flow Meter as claimed in claim 1 or claim 2 wherein the heating element is located above the midpoint of the channel and there are two temperature sensing elements each being positioned substantially equidistant between the heating element and the ends of the channel.

4. A Calorimetric Flow Meter as claimed in any preceding claim wherein the temperature sensing elements are operative to detect a temperature difference between their locations.

5. A Calorimetric Flow Meter as claimed in any preceding claim wherein the integrated circuit is a CMOS integrated circuit.

6. A Calorimetric Flow Meter as claimed in any preceding claim wherein means are provided to allow communication between the integrated circuit and external circuitry.

7. A Calorimetric Flow Meter as claimed in claim 6 wherein the means for allowing communication is a direct electrical connection.

8. A Calorimetric Flow Meter as claimed in claim 6 wherein the means for allowing communication is a wireless connection.

9. A Calorimetric Flow Meter as claimed in any one of claims 4 to 8 wherein the integrated circuit additionally incorporates processing means to calculate a mass flow from the temperature difference detected by the temperature sensing elements.

10. A Calorimetric Flow Meter as claimed in any preceding claim wherein additional circuit elements are incorporated into the integrated circuit.

11. A Calorimetric Flow Meter as claimed in claim 10 wherein the additional circuit elements include means operative to control the heating means.

12. A Calorimetric Flow Meter as claimed in claim 10 or claim 11 wherein the additional circuit elements include means operative to interface between the heating and sensing means and external electronic control means.

13. A Calorimetric Flow Meter as claimed in any one of claims 10 to 12 wherein the additional circuit elements include means operative to receive and store calibration data for the temperature sensing means.

14. A Calorimetric Flow Meter as claimed in any one of claims 10 to 13 wherein the additional circuit elements include means operative to convert analogue signals to digital signals.

15. A Calorimetric Flow Meter as claimed in any one of claims 10 to 14 wherein the additional circuit elements include means operative to carry out calculations on the digital signals to facilitate improved or additional performance or to improve accuracy or to compensate the measurements for external or internal change.

16. A Calorimetric Flow Meter as claimed in any preceding claim wherein the integrated circuit is mounted on a lead frame.

17. A Calorimetric Flow Meter as claimed in claim 16 wherein holes in the lead frame coincide with each end of the channel, the lead frame otherwise lying across the mouth of the channel so as to form a wall of a passageway.

18. A Calorimetric Flow Meter as claimed in claim 17 wherein there are slots provided in the lead frame alongside that portion of the lead frame forming a wall of the passageway.

19. A Calorimetric Flow Meter as claimed in claim 18 wherein the slots do not extend past the holes in the lead frame at either end of the passageway.

20. A Calorimetric Flow Meter as claimed in any preceding claim wherein there are additionally implemented on the integrated circuit temperature measurement means at the fluid inlet and the fluid outlet such that the errors due to the inlet and outlet temperatures not being equal can be corrected by calculation

21. A method of manufacturing an encapsulated calorimetric flow meter comprising the following steps: providing an integrated circuit assembly incorporating a fluid flow channel, at least two temperature sensing elements operative to measure the temperature in different regions of the channel and a heating element located in between the temperature sensing elements to heat a region of the channel; applying a quantity of gel to the integrated circuit such as to cover at least each end of the channel, thereby forming a gel-covered assembly; inserting the gel-covered assembly into a cavity of a moulding tool ensuring that at least a portion of the gel is in contact with a surface of the cavity; introducing a plastic mould compound into the cavity so as to encapsulate the gel-covered assembly except for the portion in contact with the cavity surface; and removing the assembly from the cavity, whereby there is an opening defined in the plastic mould encapsulating the gel-covered assembly at each end of the channel thus allowing fluid to flow through the channel.

22. A method of manufacturing an encapsulated calorimetric flow meter as claimed in claim 21 wherein the channel is filled with gel before the integrated circuit is encapsulated.

23. A method of manufacturing an encapsulated calorimetric flow meter as claimed in claim 21 wherein the lead frame has holes which coincide with the end of the channel when the integrated circuit is mounted on the lead frame and the gel is applied so as to cover the holes in the lead frame.

24. A method of manufacturing an encapsulated calorimetric flow meter as claimed in any one of claims 21 to 23 wherein the channel is formed by etching.